



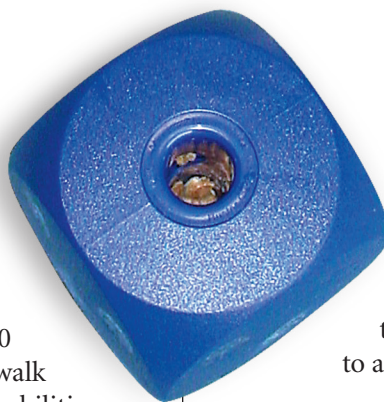
The April 2004 *Clean Run* carried a feature entitled “This Dog Has a What?” To jog your memory, Kathleen Monje questioned the use of the term “work ethic” to describe dogs that live to be trained, that perform with unbridled enthusiasm, and that embark on the hundredth tedious weave entry exercise as gung-ho as they did the first. Well, I admit both to being someone with more than a “nodding acquaintance with learning theory” and to applying the term work ethic to our canine partners. And while I in no way mean to imply that dogs do or don’t have ethics, I do think work ethic is an apt term to describe those dogs that exert that extra “oomph” during training. Moreover, the phenomenon of *learned industriousness* is well established in learning theory literature.

There is no question that some individuals do work harder than others, whether we’re speaking of people or animals. One college professor prepares a new curriculum each term; another teaches from the same old notes she developed years before. One colleague stays late and works weekends to finish a project; another packs up the office at 6:00 p.m. each day. One dog runs faster over the dogwalk than another, despite comparable physical capabilities and reinforcement histories. Indeed, J.B. Watson (1930-1970), in his distinguished book, *Behaviorism*, argued that:

“The formation of early work habits in youth, of working longer hours than others, of practicing more intensively than others, is probably the most reasonable explanation we have today not only for success in any line, but even for genius.”

This Dog Has a Work Ethic? You Bet!

By Pamela Reid, Ph.D.
Photos By Clean Run



Watson, with his immutable faith in nurture, clearly overstated his case. We all know that not every child can be a prodigy, nor can every dog be a “K-9-stein.” We are all products of our genetic material. However, like Watson, no one is claiming that work ethic is a built-in attribute commonly ascribed to Border Collies and other breeds of that ilk. Rather, individual differences in industriousness appear to be directly linked to the animal’s history of being rewarded for hard work. Within the confines of our individual genotypes, learning theorists have demonstrated that people can be

imbued with workaholism. Many readers will be familiar with the claim that schedules of partial reinforcement create animals that exert extra effort. Intermittent reward schedules reliably produce higher rates of response and greater persistence in the face of extinction. When the researcher cuts off further rewards, the animal that had been working for intermittent reinforcement will continue responding far longer than if it had been working for continuous reinforcement. But there’s more to the story than just that—learned industriousness refers to a generalized phenomenon.

Instill a Work Ethic

• Reward Intermittently

Animals experienced with intermittent rewards are likely to try harder in many tasks, not just the activity for which they earned occasional reinforcement. In one study, a group of rats was fed for each trip down a runway and another group

was only fed after every 15 trips down a runway. Next, all the rats were taught to press a lever for food on a continuous schedule: each lever press earned a piece of food. When the experimenters eventually disconnected the feeder, the rats that had been rewarded for every 15 trips down the runway persisted in pressing the lever far longer than did the rats rewarded for every trip down the runway. Partially rewarding one activity actually increased extinction performance (how long the rats would continue to press the lever) on an entirely different task.

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Intermittent reinforcement can increase speed as well. Rats that earlier had been rewarded after 15 lever presses ran faster down an alleyway for food reinforcement than rats that earlier had been rewarded after each lever press. Now I can just hear you saying that these rats ran faster, for longer because they hadn't eaten as much as the continuously reinforced rats; but be assured that the researchers controlled for the animals' satiety as a factor.

People follow suit as well. College students were rewarded for moving a peg back and forth in a board. Some students were rewarded after each move; others were rewarded for 50% of the moves. After a time, rewards were terminated, and the students eventually stopped moving the peg. Next, the students were rewarded continuously for pressing a button. When rewards were terminated for this task, button-pressing continued far longer in the group of students that had been intermittently rewarded for moving the pegs.

• Reward Hard Physical Work

Experience shows intermittent reinforcement is not the only means to train learned industriousness. Rewarding physical effort also produces animals that work harder on various tasks. Many of the studies on learned industriousness involve rats pressing levers for food, levers that researchers manipulate to require varying effort to depress. Rats rewarded previously for high-effort lever pressing ran faster for food in a runway, took shorter breaks between successive runs, and persisted in running during extinction trials far longer than rats previously rewarded for low-effort lever pressing. And I promise you that this didn't happen just because the high-effort lever pressing rats developed stronger muscles, enabling them to run faster! Students took part in a similar experiment. They first pressed a pad that required high or low pressure for reward and then, in an entirely different environment, they were given anagrams to solve. The students who had been rewarded for pressing the high-pressure pad solved the anagrams more quickly than the students with the low-pressure task.

I discovered one study that suggests simply feeding your dog with food-puzzle toys, like the Buster Cube® or the Tricky Treat Ball®, may contribute to the development of learned industriousness. Common laboratory cages for rats have a feeder attached to the outside of a wire mesh ceiling or wall, requiring the rat to gnaw at their food pellets through the mesh. This experiment compared rats that had to gnaw at their daily ration of food for 9 or 27 days with rats that received their food pellets on the cage floor (no gnawing required). Rats that had to expend physical effort to gnaw at their food for 27 days ran faster in a subsequent runway experiment than did rats that had easy access to their food or than rats that gnawed for a shorter period of 9 days.

• Reward Hard Mental Work

Requiring people to exert significant cognitive effort also contributes to learned industriousness. While I could find no research that varied the difficulty of mental tasks with animals, there is plenty of evidence with people to support this thesis. College students were given problems that differed in complexity: some had to solve difficult anagrams, others had simple anagrams to solve, and still others just had to read lists of words. Another group, called the "yoked" control, experienced the same patterns of success and failure as did the students working on the difficult anagrams but they were selectively rewarded for low effort and not rewarded for high effort. Later, all the students were given *unsolvable* problems. Only the students rewarded previously for high effort showed increased persistence on the impossible tasks. In another study, students who were rewarded for solving difficult cognitive tasks subsequently wrote longer essays of higher quality than did their counterparts, who had been rewarded for solving simple tasks. Working harder after being rewarded for solving tough problems has been demonstrated with high school students, learning-disabled children, and employees.

A Good Work Ethic Contributes to Self-Control

Self-control refers to an animal's or a person's ability to forego an easily obtained reward and instead, exert extra effort to achieve a larger, often delayed, reward. Animals (and at least one person, judging from the impoverished state of my savings account) are notoriously poor at rejecting short-term, small rewards in return for long-term, large rewards. But animals that have learned to be industrious are better able to withstand small sacrifices for larger gain. For example, rats given a choice between a compartment that offers a large food reward for high-effort lever presses and a compartment that offers a small food reward for low-effort lever presses invariably choose the latter. If the rats are then taught to run in an alleyway for food reinforcement every fifth time, they are much more likely, when later presented with the same choice, to select the high-effort, large-reward compartment than rats that were reinforced for every run in the alleyway.

Corresponding results were documented when 7- and 8-year-old children were given a choice between a small amount of money for free or a large amount of money for a tedious writing task. Initially, the kids preferred the free money. Next, some children were paid for solving challenging cognitive problems, while others were paid whether they solved the problems or not. When the children were again given the choice between working for money and getting money for free, only the group rewarded for high performance on the cognitive tasks showed an increase in preference for the high-effort, large-reward writing task. Now it's becoming clear to me: By rewarding me with money for each and every feeble attempt to complete my piano homework, my mother unintentionally doomed me to a life of abject poverty; I never learned to save money (or play the piano).

Caution: Don't Get Carried Away

As usual, applying techniques developed in the laboratory to real-life situations proves to be an art as well as a science. Pushing your dog to perform on leaner schedules of reinforcement, forcing him to accomplish greater physical feats, and challenging him with increasingly more complex and difficult mental puzzles will not automatically result in a canine prodigy. Imposing too many demands can backfire. Asking for more than the dog chooses to offer leads to "ratio strain," where the dog simply gives up because the effort is not worth the payoff. The good news is that if you back off your demands, the dog should rebound. You can always try pushing the envelope again, bearing in mind that the training process is limited by simple economics: there will eventually be a price that's too high.

Worse, though, is asking a dog to solve mental problems for which he is inadequately prepared. This teaches the dog that he cannot succeed, that he is helpless to control his environment, a phenomenon called "learned helplessness." Related to this state is "experimental neurosis," which can develop when the animal is presented with an impossibly difficult task. In one study, dogs were taught to discriminate between distinct shapes, like circles and squares. Gradually, the discriminations were made more difficult, such as distinguishing a circle from an ellipse. When the dogs succeeded at this task, the shapes were changed until they were identical, presenting the dogs with an *unsolvable* discrimination. The dogs in the study displayed a variety of behaviors indicative of stress, including whining, panting, and pacing, before they finally gave up.

A savvy trainer knows how to build foundation knowledge and avoids discouraging the dog by setting him up for repeated failure. Training situations need to be finessed so that the dog is rewarded for increased effort, not ambushed by failure. Rehabilitating a dog suffering from learned helplessness

or training neurosis is possible, although challenging. In a structured training environment, where contingencies for reward and non-reward are extremely clear-cut, you need to reinforce even the slightest efforts to respond. You even may need to physically prompt the dog to respond at first, but should switch as quickly as possible to rewarding offered behavior. Once dogs learn that responding influences what happens to them, they often come around quite dramatically.

Can a Slacker be Made Over?

I was unable to find research that specifically compared animals that received learned industriousness training during development with those that received it as adults. It seems intuitive that the earlier an animal assimilates the maxim that "hard work pays off," the more beneficial it would be. Even so, plenty of studies reveal that the benefit accrued from early scholastic programs, like Project Head Start, tend to wash out as the children progress in the educational system. So intuition doesn't always pan out.

A savvy trainer knows how to build foundation knowledge and avoids discouraging the dog by setting him up for repeated failure. Training situations need to be finessed so that the dog is rewarded for increased effort, not ambushed by failure.

I did discover one study that showed the effect of industriousness on previously learned behavior. Rats were taught to press a lever on an intermittent schedule of reinforcement until they responded at stable rates. Then the rats were rewarded for running down an alleyway. Some rats received a reward on each run; others were rewarded every fifth run; still others didn't participate in this phase of the study. Next, the rats were returned to the operant boxes to press a lever for food on the same schedule used previously. Only the rats that were rewarded for every fifth run of the alleyway increased their rate of lever pressing, and they did so well beyond their previous rates. Another study that used the same type of training experiences produced rats so determined to press a lever that they did so at high levels, even when the experimenters occasionally shocked them for responding. The continuously rewarded rats gave up quickly after experiencing a few shocks (all the rats were equally hungry). Raising the required number of responses, raising the amount of physical effort required, increasing the difficulty of cognitive problems, or increasing the speed or accuracy with which cognitive problems were completed, all produced, in people, transfer of increased effort to previously learned activities.



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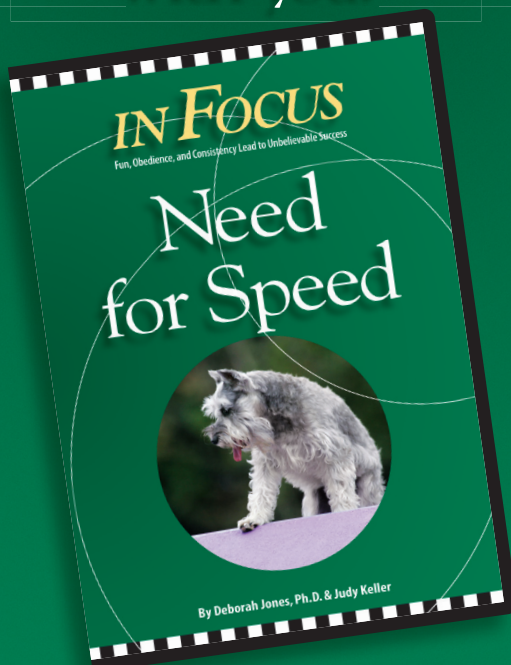
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Try, Try Again

There are many psychological theories explaining the phenomenon of learned industriousness. Amsel (1972) offers the most intuitive explanation: responding in the presence of any disruptive event (non-reward, increased physical effort, escalated mental exertion, and so on) acts to condition “try strategy” when faced with a frustrating situation. Regardless of the underlying learning process, there is no question that rewarding animals selectively for extra effort results in a generalized assiduousness.

So scorn the use of the term “work ethic” if you like or instead adopt the more pretentious but scientifically correct “learned industriousness.”

But recognize that there is more to this than Monje suggests: reinforced behavior persists.

The types of challenges mastered and the pattern of rewards doled out can produce dogs with varying degrees of zeal. Continuous

reinforcement for passable performance can lead to a reliable dog that methodically racks up the Q ribbons. But intermittent rewards, doable challenges, and differential reinforcement of extra effort and excellence can produce a tireless, prodigious, and fanatical dog: a dog with an inspiring work ethic. Besides, I happen to enjoy the anthropomorphic vision of a battalion of agility dogs marching toward the training field in their matching suits and ties, with course diagrams and training logs spilling from their briefcases. May we all be blessed with such agility “trainaholics.” 🐾



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